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ASSESSING THE ECONOMIC IMPACTS OF TRANSPORTATION IMPROVEMENT PROJECTS

Executive Summary and
Final Summary Report

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Executive Summary

Transportation planning is an important step for ensuring the vitality of the state of Utah. Providing a transportation system that enhances the economic vitality of the state is of utmost importance in maintaining the economic prosperity that is currently enjoyed in the state. To provide a methodology in which the economic development impacts of transportation improvement projects can be included in the decision making process, the Utah Department of Transportation (UDOT) contracted with the Department of Civil & Environmental Engineering at Brigham Young University (BYU) to explore the alternatives available to include this impact in the decision making process. The following executive summary introduces the purpose and need for the given research, the procedure that was followed, the preliminary results, and the recommended action as a result of the research. A more detailed summary is provided following this executive summary, while a full analysis report can be obtained through the UDOT Research and Development Division, UDOT Report No. UT-06.03.

Purpose and Need

The transportation system provides mobility; or the ability to get from a place of origin to a place of destination; for people, goods, and services. Efficient transportation systems will positively impact the economy; while deficient systems, slowing the connection between the economic sectors, will cause missed opportunities and lower production capabilities. It is recognized that vehicle miles of travel (VMT) will continue to grow in the state of Utah as the population increases. UDOT has committed themselves to providing "optimum levels of mobility [with] well-maintained, safe facilities" (UDOT 2004). Primarily when considering the fourth of UDOT's four strategic goals—to increase capacity—funding availability generally places constraints on the extent of capacity increases. Therefore, funding those projects that are most critical and beneficial to the vitality of the transportation system is both a fiscally responsible and necessary action to ensure the states economic competitiveness.

Selecting the best projects involves several criteria; one of these is the degree of support provided to a growing economy. The inherent task of a transportation system to support the economy is furthered by the Transportation Equity Act for the 21st Century (TEA-21) (UDOT 2004), which calls to:

> "Support the economic vitality of the United States, and the States, and metropolitan areas, especially by enabling global competitiveness, productivity and efficiency."

The current project prioritization practice of UDOT consists of a general ranking of projects by UDOT and the associated Metropolitan Planning Organization (MPO) in the urban area. Following the general ranking, recommendations on project selection are provided by UDOT to the Transportation Commission. A set of scoring factors have been developed by UDOT to aid in this process with weights assigned to transportation efficiency and safety factors such as total average daily traffic (ADT), volume to capacity (v/c) ratios, transportation growth potential, and crash experience. In addition to the transportation efficiency and safety related factors, the possible inclusion of an economic development related factor was in question. There was a need, therefore, to assess the economic impacts of transportation improvement projects and to investigate possible evaluation criteria and tools to incorporate economic evaluation criteria in the state's transportation planning process.

Research Process and Results

To address the need to investigate the inclusion of economic evaluation criteria in the transportation planning process a steering committee was created to gather expectations of transportation professionals and decision makers regarding economic development impacts. The steering committee included a cross section of experienced professionals; representatives from the Transportation Commission (two representatives), UDOT (seven representatives), MPOs (three representatives), and academia (three professors and two students).

During the steering committee meetings it was emphasized that the inclusion of economic criteria in the planning process seeks in part to satisfy the 2005 General

Session Senate Bill 25, which "requires the Transportation Commission, in consultation with the department, to develop a written prioritization process for the selection of new transportation capacity projects" (Senate 2005). It was determined in the steering committee meetings that the preference of the committee members was to include economic criterion as a second tier evaluation applied to an initial short list of projects. This recommendation was made to the Transportation Commission in the July 19, 2005 Transportation Commission meeting and was subsequently approved (UDOT 2005). It was noted that these projects include only those with a total project cost of $5 million or greater. The first tier evaluation would be used to rank projects using transportation efficiency and safety metrics, while the economic component, along with other second tier evaluation factors, would be used to aid the Transportation Commission in their final recommendations.

The steering committee and subsequent Transportation Commission recommendation for economic evaluation was based on the results of this research on the economic development impacts of transportation improvement projects. This research included three primary resources. The first two were previously completed surveys: the National Cooperative Highway Research Program (NCHRP) Synthesis 290 (Weisbrod 2000) and a report to the Congressional Committee by the United States Government Accountability Office (GAO) (GAO 2005), both summarized by the BYU research team. The third resource was an independent BYU/UDOT survey of both local and national leaders administered by the research team.

The NCHRP and GAO surveys revealed that the majority of Departments of Transportation (DOTs) throughout the nation are somewhat sporadic in their efforts to regularly assess the economic development impacts in the transportation decision making process. A summary of additional findings of these surveys, as well as the BYU/UDOT survey are provided in the paragraphs that follow.

The NCHRP Synthesis 290 report was completed in June 2000 by Glen Weisbrod of the Economic Development Group, Inc. The survey respondents included 36 state transportation agencies, eight MPOs, and seven Canadian provinces (Weisbrod 2000). Overall conclusions made by this report indicated that a "high recognition of the role of economic development impacts in transportation planning" (Weisbrod 2000). The

increase in the number and sophistication level of these studies "appears to be enhanced by the emergence of increasingly sophisticated economic impact software tools during this period" (Weisbrod 2000).

Other lessons learned from this report were that an economic impact analysis (EIA) should never be used as a substitute for user impacts (e.g., travel time savings, travel costs, and safety). The report also indicated that evaluations were most frequently measured in terms of changes in associated employment (jobs), income (wages), and business output (sales) within some region and that most agencies conducted detailed studies of economic development impacts only when warranted by specific needs, the most common motivation being a response to local concerns.

The GAO Report summarized a survey conducted from August through October 2004. Overall, 43 of the 50 state DOTs responded to the survey and 20 of 28 transit agencies (GAO 2005).

Some of the lessons learned from this report were that if formal economic analyses were used they tended to be completed more often for transit projects than for highway projects primarily because of the federal "New Starts" requirements for transit projects. Officials surveyed reported that they considered a project's potential benefits and costs when considering project alternatives but often did not use formal economic analyses to systematically examine the potential benefits and costs. Survey respondents also indicated that a number of factors such as public support or the availability of funding tended to shape transportation investment decisions. The survey indicated that one set of challenges faced in the assessment of economic impacts on transportation projects involved limitations in the methods themselves—for example, limitations in the ability of forecasting models to anticipate changes in traveler behavior or changes in land use that subsequently affect economic development impacts.

The BYU/UDOT survey was administered to transportation professionals both within the state of Utah and across the nation. In addition, the survey was also administered to decision makers in the state, including the Utah Transportation Commission. A few key findings from this survey are presented in this executive summary.

One of the first questions asked in the survey was the weight used or recommended for use when including economic development impacts in the decision making process. A summary of these results is included in Table ES-1.

Table ES-1. Summary of Opinions of Weights to be placed on Economic Development

Survey Group	Recommended or Current Weight of Economic Impact Analysis in Selection Process			
	> 10%	**10%**	**< 10%**	**No set weight**
National Transportation Professional	36%	14%	7%	43%
Utah Commissioner and Decision Maker	13%	38%	38%	13%
Utah Transportation Professional	29%	43%	0%	29%

The survey results indicated low levels of investment in external consulting for an EIA. Agency spending on EIAs could be categorized as follows: 10 percent of all respondents invest 0.2 percent of the total agency budget; 30 percent invest 0.02 percent; and 60 percent invest no money on external consulting. The survey also indicated that investments on in-house full time equivalent (FTE) specialists to conduct economic analyses were as follows: 10 percent employ 4 FTE; 10 percent employ 3 FTE; 10 percent employ 2 FTE; 20 percent employ 1 FTE; and 50 percent employ 0 to 0.5 FTE. The level of involvement and inclusion of economic development impacts varies widely as illustrated in these results.

The results of all three studies indicated that throughout the United States and Canada there has been relatively sporadic use of economic investment analyses. Although the level of recognition of the role of economic development impacts and the level of sophistication in this analysis is increasing, the overall trend is still towards the completion of economic development studies in direct response to specific needs, primarily those of concerned residents with regard to specific projects.

Economic Development Tools

A number of tools are currently available to evaluate the economic development impacts of transportation projects. In the presentation of the possible tool packages the two terms that will be used to distinguish between the methods are user impact analysis

(UIA) and EIA. UIA is a traditional benefit/cost analysis (BCA) considering only clear direct impacts to travelers (e.g., travel time savings, travel costs, and safety) and to the agency (e.g., construction costs). An EIA is a BCA that also includes benefits to the economy, specifically how the money flows back into or out of the pockets of those in the study area. The Federal Highway Administration (FHWA) "Economic Impact Analysis Primer" suggests that the best method and tools for any given project depends on the scale, complexity, and controversy of the project (FHWA 2003).

Economic models are further categorized as static or dynamic models. Static models are those models that predict economic impacts for the relatively short term. Dynamic models are designed to simulate effects of factors that change the relative costs and competitive position of businesses in an area, as can occur from changes in occupation wage rates, population and labor force rates, energy and transportation costs, cost of capital, etc.

A summary of economic development models and their estimated initial and annual costs are provided in Table ES-2. In addition to the formal tools outlined, standard BCA can also be used to identify user costs associated with project implementation.

Process Development

This section of the executive summary presents a summary of the process development portion of the research. The purpose of this task was to identify alternatives for a process whereby economic impacts can be incorporated in the evaluation of capacity projects if such analyses are required. The two primary evaluation methods summarized include BCA and project scoring.

BCA is a tool for incorporating economics into the planning process. Generally speaking, a BCA weighs the benefits versus the costs of the project; there are however, various types and levels of complexity of analysis. The difference in the possible tool options is to what extent are benefits and costs measured. The two types of BCA identified previously include UIA and EIA.

Table ES-2. Summary of Economic Development Models

Software	REMI TranSight	HEAT	HERS-ST	STEAM	RIMS-II	IMPLAN
Produced by: (Organization)	Regional Economic Models, Inc. (REMI)	Cambridge Systematics (CS)	Federal Highway Administration (FHWA)	Federal Highway Administration (FHWA)	Bureau of Economic Analysis (BEA)	Minnesota IMPLAN Group (MIG, Inc.)
Type of model	Dynamic	Dynamic	Benefit/Cost	Benefit/Cost	Input/Output	Input/Output
Initial Cost	Varies (>$100,000)	Varies. >$500,000 for Montana DOT. If CS works as a systems integrator, given REMI products are available, cost may be >$100,000	Free	Free	Free	Varies for region files desired
Annual Cost	Varies (~$20,000)	Varies (~$20,000)	None	None	None	Varies
Department Costs[1]	1-3 FTE	1-3 FTE	1 FTE	0.5-1 FTE	0.5-1 FTE	0.5-1 FTE
Inputs	VMT, VHT, Emissions (VOC), Safety, Fuel demand, Time savings (from a transportation planning model)	Depends on set-up, but similar to REMI TranSight (for the Montana DOT, CS created a travel demand model)	Highway data in HPMS (Highway Performance Monitoring System) format. Can use GIS files for producing maps	From four-step travel demand models (e.g. TP+), person and vehicle trip table	Industry category, job cost (in 1997 dollars), location; a set of *multipliers* for the study region	Industry category, job cost, location; a set of *multipliers* for the study region
Outputs	Employment by industry, output by industry, wage rates and personal income, population by demographic group, gross regional product	Prioritization of projects (based on B/C), capital and operating costs of highway improvements, employment, industry impacts	REMI ready parameters, cost of highway deficiencies, capital expenditure justification	Network traffic effects of projects, compares projects of different modes, estimation of system-wide impacts	Wages/salaries, economic activity resulting from spending, jobs created	Impact data ("what if" data, e.g. what if industry x adds 200 jobs in Utah county)
Transportation terms	Yes	Yes	Yes	Yes	No	No
Economics analysis intensive	Yes	Yes	No	No	No	No
Transportation modeling	No, but inputs are from transportation model	Yes	No	No	No	No
Interface with Planning Model	Yes	Yes	Yes	Yes	No	No
Compatible with Governors Office of Planning and Budget (GOPB) model (REMI Policy Insight)	Yes	Yes	Yes	Yes	No	No
Support available	Yes	Yes	Yes	Yes, through Cambridge Systematics	Yes	Yes

[1] Department costs are estimates and are in units of Full Time Equivalent (FTE). Department costs could be supplemented with Consultant services

The foremost advantage of a UIA is its simplicity, as a UIA can be done in-house or by consultants, oftentimes without trained economists. Consulting costs for such a UIA would vary depending on the level of complexity and analysis. UIAs only provide monetary savings and costs to users (not job creation or gross domestic product predictions); however, the users can be distinguished into market categories such as personal, freight, or other business user.

EIA complexity depends primarily on the length of the time period to be analyzed. Static analyses, or measurements of impacts up to a year, can be completed with input-output (I-O) spreadsheets such as RIMS-II or IMPLAN. Dynamic analyses or measurements of impacts over several years require more powerful econometric modeling software such as Policy Insight™ or TranSight™ by Regional Economic Models, Inc. (REMI®). Economic development models and software programs such as REMI® are very specialized with only a handful of major consulting firms that offer these services. As these are specialized consulting services, the costs for this work is relatively high as noted in the initial and annual cost summaries of Table ES-2.

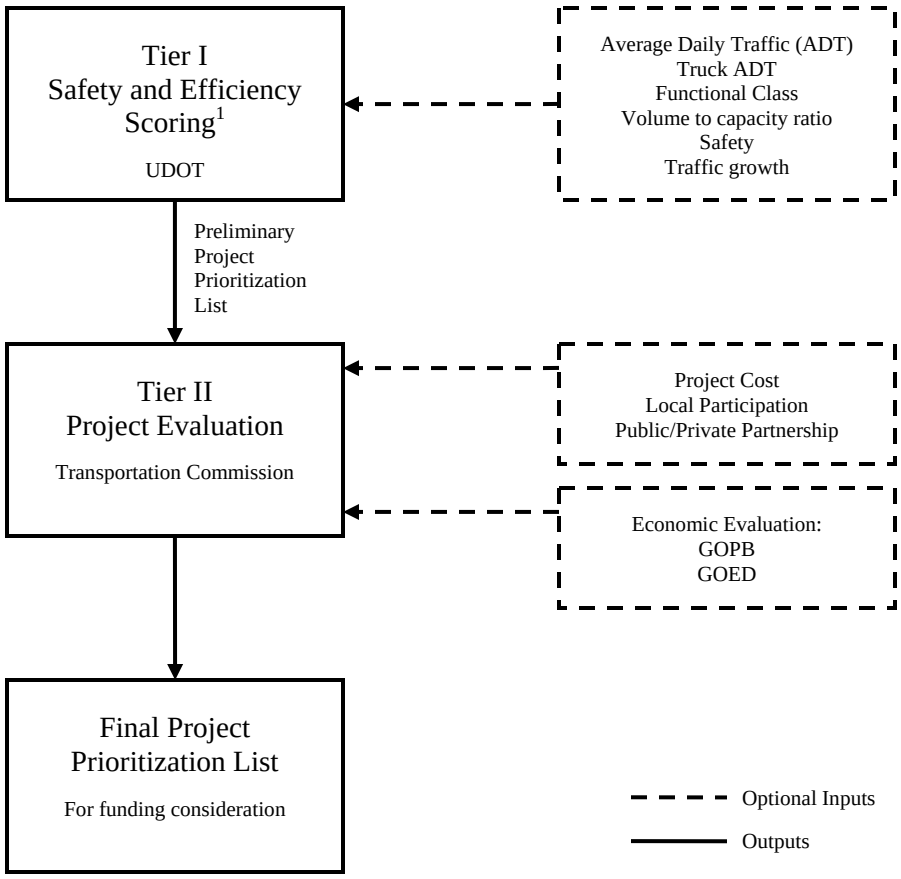
A project selection scoring system is another way to incorporate economics into the planning process. The results of a BCA can be used to order or prioritize a list of project alternatives as to which is the most "economical." If this is the only project selection criteria then the first and best choice is the project that scores the highest in the BCA. However, this is typically not the only selection criterion for projects, thus the BCA comprises only a portion of the total decision. This requires a categorical scoring process under which each project receives a score in each criterion and the individual scores are added for a total project score. To determine the weight of the BCA in the total scoring process, the type of BCA used (UIA, static, or dynamic), its accuracy, and the extent of the analysis should be considered. The total project scores, therefore, are the final prioritization results.

Recommended Action

In response to the assessment of the economic development impacts of transportation improvement projects, the steering committee has recommended that a two-tier project prioritization process be implemented for all projects with a total cost of $5 million or greater. As indicated previously, the first tier submits all eligible projects under consideration for funding to an objective scoring system that includes transportation efficiency and safety factors as formulated by UDOT and approved by the Transportation Commission (UDOT 2005). Only those projects selected in the first tier for further analysis would be evaluated in the second tier, where economic development impacts are considered.

One of the primary reasons for this recommendation stems from the present high cost and complexity of the techniques and models used to quantify the economic development impacts of transportation improvement projects as summarized in Table ES-2. Rather than expending the limited resources of the Department on a formal economic development modeling process, the steering committee recommends, at the present time, that an economic development prioritization process be implemented wherein the Transportation Commission will request information from the Governor's Office of Planning and Budget (GOPB) and/or the Governor's Office of Economic Development (GOED) on the economic potential (e.g., job creation) for each project selected in the tier one process. This information will then be used by the Transportation Commission in conjunction with other tier two evaluation criteria (e.g., project costs, local participation, private/public partnering, and others) to make final project funding decisions.

This type of analysis includes key components of both BCA and project scoring processes, without assigning specific scores or weights to projects in the second tier evaluation process. The information, however, will be used by the Transportation Commission in making final funding decisions. A summary flowchart of the recommended process is provided in Figure ES-1.



[1] Process applies to projects with total cost of $5 million or greater

Figure ES-1. Proposed Evaluation Flowchart.

1 Introduction

Transportation planning is an important step for ensuring the vitality of the state of Utah. In the State of Utah Long Range Transportation Plan (Transportation 2030) it is recognized that vehicle miles of travel (VMT) will continue to grow as the population in the state increases (UDOT 2004). In response to this growth, the Utah Department of Transportation (UDOT) has committed themselves to providing "optimum levels of mobility on well-maintained, safe facilities" (UDOT 2004). To keep this commitment UDOT has developed four strategic goals to address the transportation needs of the future, namely: 1) take care of what we have, 2) make it work better, 3) improve safety, and 4) increase capacity (UDOT 2004). The common thread that ties these four goals together is the efficient use of transportation funding to provide for the needs of the system. Primarily when considering the fourth goal—increase capacity—funding availability generally places constraints on the extent of the capacity that can be increased. Projects should continually be identified to meet the demands placed on the system; however, not all projects will receive funding for construction. Those that are most critical and beneficial to the vitality of the transportation system should be selected. The consideration of these projects occurs in the planning process as part of the long-range plan (LRP). Although several aspects of each project should be considered in making this selection, one in particular, identified in Transportation 2030, is a directive originating from Title 23 of the United States Code, as amended by the Transportation Equity Act for the 21st Century (TEA-21) (UDOT 2004); that is to:

> "Support the economic vitality of the United States, and the States, and metropolitan areas, especially by enabling global competitiveness, productivity and efficiency."

In allocating resources to address the previously mentioned four strategic goals, UDOT has established the following priorities: 1) preservation of existing infrastructure, 2) safety enhancements, 3) operation of the existing system, and 4) capacity enhancements (UDOT 2004). The transportation planning process is an important part of determining which projects should be funded to address these priorities. Economic vitality of the project itself, combined with the impacts of the project to the economy of the state as a whole should be considered when making important decisions on how to best allocate transportation funds. There was a need, therefore, to assess the economic impacts of transportation improvement projects and to investigate possible evaluation criteria and tools to incorporate economic evaluation criteria in the state's transportation planning process.

The purpose of this project was to assess the economic impacts of transportation improvement projects and to evaluate the tools available for incorporating possible economic evaluation metrics in the transportation planning process. This was to be completed by: 1) determining the state of the practice for transportation economic analysis, 2) establishing the criteria that should be considered in the economic analysis process, 3) evaluating the tools available to meet these needs, and 4) making recommendations on how to proceed to meet these objectives. The results of this project can be incorporated into the LRP process as another tool in the toolbox to evaluate mobility and systems analysis. This tool will provide direction and guidance to UDOT personnel on the prioritization of projects based on economic performance and analysis. The results of this research will be available for implementation in the planning process, providing an opportunity for increased efficiency in project selection using economics as one of the available selection metrics.

This final summary report presents: 1) a brief summary on UDOT's current practice for project prioritization, 2) intermediate outcomes of the steering committee process aimed at evaluating the economic impact of transportation projects, 3) considerations of economic development project selection from the literature and a survey of other state's practices, 4) a brief evaluation of the models available for evaluating economic development attributed to highway improvement projects, 5) a preliminary summary of the tools and process available to consider economic impacts of

transportation projects, 6) recommended alternatives for UDOT consideration, and 7) conclusions and committee recommended action. As indicated, this report presents only a summary of the work completed to address the purpose and need. A full analysis report for the project can be obtained through the UDOT Research and Development Division, UDOT Report No. UT-06.03.

2 The Current Project Prioritization Practice of UDOT

The Utah Transportation 2030, State of Utah Long Range Transportation Plan includes four strategic goals to help meet the Department's mission statement of "Quality Transportation Today," "Better Transportation Tomorrow," and "Work[ing] to Connect Communities" (UDOT 2004). These goals are: 1) take care of what we have, 2) make it work better, 3) improve safety, and 4) increase capacity (UDOT 2004). All four goals are equally important in meeting the needs and fulfilling the mission statement of the Department.

The first goal listed, "take care of what we have," includes the preservation of existing facilities, such as pavement and bridges (UDOT 2004). The second goal, "make it work better," incorporates the strategies of intelligent transportation systems (ITS), access management, and transportation demand management (TDM) in the prioritization process. ITS deals with the use of technology to inform individuals of roadway and traffic conditions (e.g., Utah CommuterLink) to aid in transportation decisions. Access management involves improving roadway system flow and safety by reducing dangers or "side friction" that access points such as driveways, on-street parking, and turning movements can cause. In addition, access management deals with improving medians and acceleration/deceleration lanes which can improve the visual appeal and safety of the roadway. TDM includes a number of policies and procedures with the intent of reducing travel demand, thus lowering overall VMT in Utah. This includes encouraging travel partnering such as carpools through the use of high occupancy vehicle (HOV) lanes, increased utilization of existing roadways through the use of reversible lanes, and multimodal transportation use. The next goal listed in the LRP is catered towards improving safety through the use of various safety-enhancing programs. Each of these programs has as its goal the improvement of safety in areas related to transportation and

traffic. The final goal listed is to increase capacity. Capacity enhancement projects are important, especially when considering the continual increase in Utah's population and the more rapid increase in overall travel demand (i.e., increased VMT) (UDOT 2004).

While the four goals discussed previously work together to improve the transportation system of Utah, budget constraints often limit the extent to which they can be realized. As a result, funding recommendations are made to the Transportation Commission using the following priorities (UDOT 2004):

- Preservation of existing infrastructure.
- Safety enhancements.
- Operation of the existing system.
- Capacity enhancements.

These follow closely the strategic goals discussed previously. It is noted that capacity enhancements are last in this list. The LRP notes that capacity enhancement projects are generally considered after the other three goals are addressed (UDOT 2004). Currently UDOT is devoted to focusing on the most efficient mix of ITS, access management, and TDM along with additional capacity enhancement projects as funding and need are apparent. Therefore, funding those projects that are most critical and beneficial to the vitality of the transportation system is both fiscally responsible and necessary to ensure the state's economic competitiveness.

After a general ranking of projects is completed, recommendations on project selection are provided by UDOT to the Transportation Commission. These recommendations in the urban areas include input from the local Metropolitan Planning Organization (MPO). An array of factors with set weights has been developed concurrently with this research to aid in this selection process. These include factors such as total average daily traffic (ADT), truck ADT, volume to capacity (v/c) ratios, functional class, growth potential, safety, and so forth. In addition to the traffic related factors, the question of when and how to incorporate an economic development related factor in this ranking procedure was addressed in this study.

3 Intermediate Outcomes of Steering Committee Meetings

To evaluate the economic development impacts of transportation projects and to determine how to include these impacts in the decision making process, a steering committee was created to gather expectations of transportation professionals and decision makers regarding economic development impacts. The steering committee included a cross section of experienced professionals consisting of representatives from the Transportation Commission (two representatives), UDOT (seven representatives), MPOs (two representatives), and academia (three professors and two graduate students).

During the steering committee meetings it was emphasized that the inclusion of economic criteria in the planning process seeks in part to satisfy the 2005 General Session Senate Bill 25, which "requires the Transportation Commission, in consultation with the department, to develop a written prioritization process for the selection of new transportation capacity projects" (Senate 2005). This mandate allows the Department an opportunity to develop a tool to evaluate capacity projects. This tool can be used to rank projects using transportation metrics, while the economic component of the tool may be used to shuffle top priority projects. It was determined in the steering committee meetings that the preference of the committee members was to include economic criterion as a second tier evaluation applied to an initial short list of projects. This recommendation was made to the Transportation Commission in the July 19, 2005 Transportation Commission meeting and was subsequently approved (UDOT 2005). The weight that the economic criteria would have in this second tier evaluation was evaluated to best meet the needs of the process. To help in this process, opinions of other DOTs that incorporate economic analyses in their planning process were gathered to begin to assess what would be an appropriate weight. With this the steering committee was also interested in knowing what factors should make up an economic evaluation. For this

purpose a series of surveys were created for three specific audiences: 1) Utah decision makers, including the Transportation Commission; 2) Utah transportation professionals; and 3) national transportation professionals. The responses to this survey as well as previous GAO and NCHRP surveys are presented in Chapter 4.

4 Considerations of Economic Development in Project Selection: Findings from the Survey Results

To ascertain the state of the practice in assessing the economic impacts of transportation improvement projects from throughout the nation, the research group benefited from two previously completed surveys: the National Cooperative Highway Research Program (NCHRP) Synthesis 290 (Weisbrod 2000) and a report to the Congressional Committee by the United States Government Accountability Office (GAO) (GAO 2005). The research team also completed an independent survey of both local and national transportation planners and decision makers to gain an independent perspective of the importance of transportation projects. From the data collected researchers developed a better understanding of how many transportation agencies incorporate economic criteria, how often it is incorporated, and what weight it is given in a project selection process.

The NCHRP and GAO surveys revealed that the majority of Departments of Transportation (DOTs) throughout the nation were somewhat sporadic in their efforts to regularly assess the economic development impacts in the transportation decision making process. As a result, when the final survey was administered by BYU for UDOT, several of the respondents were somewhat unclear on how to respond because they did not include economic development impacts in their process. Those that were contacted about their participation indicated this frustration in how to respond. Those who did respond to the survey, however, provided enlightenment on the possible weighting and tools for economic development impact inclusion in the transportation decision making process.

The following sections provide a summary of the NCHRP Synthesis 290 Report, the GAO Report, and the BYU/UDOT survey, respectively.

4.1 Summary of NCHRP Synthesis 290

NCHRP Synthesis Report 290 was completed in June 2000 by Glen Weisbrod of the Economic Development Group, Inc (Weisbrod 2000). The purpose of this report was to survey government agencies and summarize the state-of-the-practice in assessing economic development impacts from transportation investments. The survey respondents included 36 state transportation agencies, eight MPOs, and seven Canadian provinces.

Overall conclusions made by this report indicate that "it is clear that there is now a high level of recognition of the role of economic development impacts in transportation planning" (Weisbrod 2000). Furthermore, there has been a "significant increase in the number and sophistication level of economic development impact studies conducted or commissioned by public agencies in the last decade. This appears to be enhanced by the emergence of increasingly sophisticated economic impact software tools during this period" (Weisbrod 2000).

Other lessons learned from this report are summarized as follows (Weisbrod 2000):

- Economic impact analysis is never seen as a substitute for user impacts.
- While confusion remains about how agencies should select among economic impacts and the meaning of "economic impacts" or "economic development impacts," evaluations are most frequently measured in terms of changes in associated employment (jobs), income (wages), and business output (sales) within some region.
- The type of analysis conducted depends on the purpose of the analysis (e.g., decision-making, planning and/or regulatory review, public education, etc.).
- Most agencies conduct detailed studies of economic development impacts only when warranted by specific needs, the most common motivation being a response to local concerns.
- Among transportation planning agencies, economic impact analysis was most common among Canadian provinces, somewhat less common among U.S. states, and least common among MPOs.

- Some of the cited problems with existing procedures for assessing economic development impacts included:
  - Results not accepted universally,
  - Inadequate data,
  - Complexity of analysis methods, and
  - Inexperience of agency staff (Canadian provinces appear to have a higher rate of conducting economic development studies using their own staff economists).
- Several agencies also noted that further economic development associated with transportation projects is not always welcome, particularly in congested metropolitan areas as well as other high density regions.

4.2 Summary of the GAO Report

The GAO survey was conducted from August through October 2004 (GAO 2005). Overall, 43 of the 50 state DOTs responded to the survey and 20 of 28 transit agencies. It is important to note that those highway projects discussed in this survey are capacity adding projects.

A sampling of the responses provided by those surveyed yielded the following lessons learned (GAO 2005).

- If formal economic analyses are used, they tend to be completed more often for transit projects than for highway projects primarily because of the federal "New Starts" requirements for transit projects.
- Officials surveyed indicated that they considered a project's potential benefits and costs when ranking project alternatives but often did not use formal economic analyses to systematically examine the potential benefits and costs.
- Survey responses indicated that a number of factors, such as public support or the availability of funding, shape transportation investment decisions.
- Respondents indicated that the decision to select an alternative is often based on indirect benefits that were not quantified in any systematic

manner, such as desirable changes in land use or increasing economic development.

- Even if steps are taken to improve the analytic information available to decision makers, overarching issues, such as the structure of the federal highway and transit programs, will affect the extent to which this information is used. Nevertheless, the increased use of economic analysis, such as benefit/cost analysis, could improve the information available, and ultimately lead to better-informed transportation investment decision making.
- One set of challenges involves limitations in the methods themselves—for example, limitations in the ability of forecasting models to anticipate changes in traveler behavior or changes in land use.
- Another set of challenges involves sources of error that can be introduced into benefit/cost calculations, such as omitting some benefits or double-counting benefits as they filter through the economy.

4.3 Summary of the BYU/UDOT Survey

Although the response rate of the BYU/UDOT survey was relatively low (23 percent or 35 of 149 surveys distributed), those responses received were very valuable in aiding in the overall study process. A few key findings from this survey are presented in the following paragraphs.

One of the first questions asked in the survey was in relation to the weight currently used or recommended for use when including economic development impacts in the decision making process, or in performing an economic impact analysis (EIA). Table 4-1 provides a summary of these results with the overall weight in the range of 10 percent to 40 percent. It is important to note that these results include only those agencies that completed an EIA.

In response to a specific question asking what types of factors should be considered in an economic impact analysis, all respondents (100 percent) in the decision maker group cited job creation; 50 percent cited job retention; 38 percent tax revenue, and 38 percent job location. Job creation and job retention appear to be the major factors

that decision makers feel is important to be included as measuring the effect of transportation projects on economic development.

Table 4-1. Summary of Opinions of Weights to be placed on Economic Development

Survey Group	Recommended or Current Weight of Economic Impact Analysis in Selection Process			
	> 10%	**10%**	**< 10%**	**No set weight**
National Transportation Professional	36%	14%	7%	43%
Utah Commissioner and Decision Maker	13%	38%	38%	13%
Utah Transportation Professional	29%	43%	0%	29%

In response to a question that asked what factors of economic development impacts the public would be most interested in, approximately 80 percent of the decision maker group respondents listed job creation as one that most interests the public, followed by commute time, project location, environmental impact (each 40 percent) and wage (20 percent).

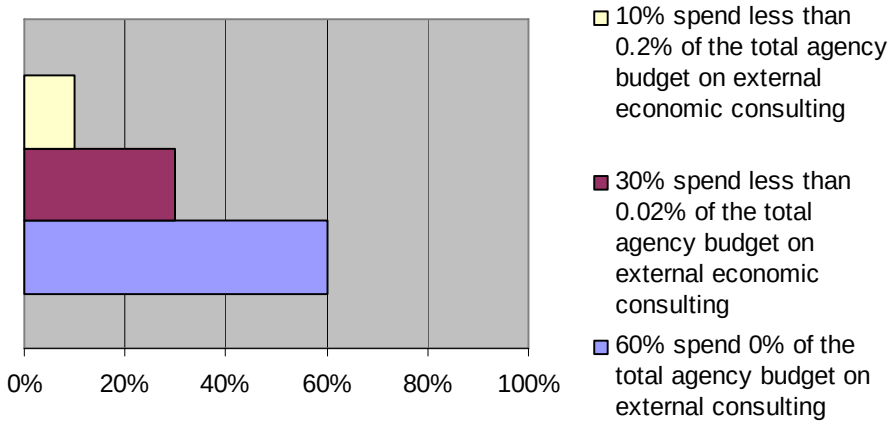
The overall level of investment to include economic development criteria in the decision making process was also requested. It was noted that UDOT is considering including only those projects with capital costs greater than $5 million in their analysis. In the national transportation professional group 67 percent of the respondents indicated that no set limit existed but they generally focused on projects greater than $5 million, while 37 percent responded they would generally evaluate projects less than $5 million. It was noted that the setup of specific transportation programs has a direct impact on the cutoff value considered.

One of the survey questions asked if there would be any inter-agency cooperation in dealing with the economic analysis process. In response to this question, 78 percent of the respondents in the national transportation professional group indicated that there is active partnering among concerned agencies, while 22 percent responded that such inter-agency cooperation was rare.

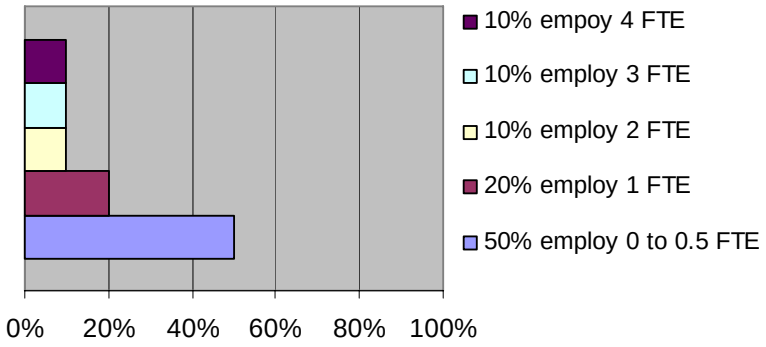
Another question asked what tools they have used for analyzing economic development impacts. The results of this question indicated that 38 percent of the respondents use Regional Economic Models, Inc. (REMI®) products (dynamic analysis);

38 percent use standard input-output (I-O) models; 13 percent use MicroBENCOST (a benefit/cost analysis tool); and 13 percent do their calculations by hand.

The final two questions asked how much of an agency's total budget is dedicated to external consulting, and how much consulting or in-house labor has been required to include economic development impacts in the decision making process. The results of these two questions are provided in Figure 4-1(a) for external consulting and in Figure 4–1(b) for in-house specialists.



(a) External Consulting for Economic Impact Analysis



(b) Full Time Equivalent In-house Specialists

Figure 4-1. Budget Allocations for Economic Impact Analyses.

4.4 Overall Summary of Survey Results

From the collected data a better understanding was gained in terms of the number of transportation agencies that incorporate economic criteria, how often economic criteria is incorporated in the process, and the weight that is given to economic criteria in the overall project selection process. The results of all three studies indicated that throughout the United States and Canada there has been relatively sporadic use of economic investment analyses. Although the level of recognition of the role of economic development impacts and the level of sophistication in this analysis is increasing, the overall trend is still towards the completion of economic development studies in direct response to specific needs, primarily those of concerned residents with regard to specific projects.

5 Evaluation of Economic Development Tools

Understanding the type of analysis that is referred to in a benefit/cost analysis (BCA) and EIA is essential to choosing the correct method. Any potential tool for incorporating economics into the planning process is in some sense a BCA; weighing the benefits versus the costs of the project. The difference in the possible tool options is to what extent are benefits and costs measured. For example will the BCA simply measure direct impacts or will it include broader indirect economic impacts? Even among these two methods there are differing levels of investigation that can be conducted.

In the presentation of the possible tool packages the two terms that will be used to distinguish between the two before mentioned methods are *user impact analysis* and *economic impact analysis*. User impact analysis (UIA) is a traditional BCA considering only clear direct impacts such as travel time, cost, and safety. EIA is a BCA including those benefits to the economy, specifically how the money flows back into or out of the pockets of those in the state (Kaliski and Weisbrod 1998). EIAs may also include societal or non-monetary impacts.

The Federal Highway Administration (FHWA) "Economic Impact Analysis Primer" suggests that the best method and tools for any given project depends on the scale, complexity, and controversy of the project (FHWA 2003). The FHWA Primer discusses both relatively simple and advanced methods of performing an EIA. The basic methods of EIA are categorized as survey studies, market studies, and comparable case studies. The advanced methods of EIA include econometric analysis requiring economic models of regional productivity. These models attempt to quantify the effects on the market from "shockwaves" created through transportation capacity projects. An economic model will measure or forecast the economic growth or capture productivity benefits (FHWA 2003).

Economic benefits are tracked through an I-O matrix, a key component of economic models. This matrix contains dependency relationships between industries, meaning how a change in demand in one industry will affect another. When expenditures are made in one industry the earnings are then supplied in turn to another industry. I-O modeling is basically the measure of how change in one industry changes another. The inter-industry relationship is called a multiplier. In this way the direct impacts are carried into indirect impacts throughout the economy. Inasmuch as the multiplier values will change from region to region, the I-O tables should be customized to the specific region and regional multipliers can be formed from surveys of businesses to observe who they buy from or sell to. Similar multipliers are created associating the industry to economic outputs such as employment, wages, and productivity or sales. Thus an I-O system is a structure to analyze economic impacts that requires industry specific expenditures and generates industry specific outputs (Bureau 2005).

Economic models are further categorized as static or dynamic models. Static models are those models that predict economic impacts for the relatively short term. The model in effect follows a single shockwave through the economy. This is much simpler than a dynamic or econometric model because dynamic systems models not only follow the response of the first shockwave on the economy but continue to analyze the changes in the economy over the long term as the demand may alter the size and characteristics of the economy (Weisbrod 1990).

Table 5-1 provides a summary of economic impact analysis models that were evaluated in this study. These models can be categorized as static models and dynamic models. A static model is often considered “sketch planning” and is favorable for agencies that may not have the resources to make analyses using expensive long-range models. These simpler analyses use readily available socioeconomic, land use, traffic congestion, economic multipliers, and other data to serve as predictive models. The data can be compiled into a spreadsheet tool to calculate the desired data. The accuracy of these models is typically limited to a length of time less than one year (Bureau 2005). STEAM, RIMS-II, IMPLAN in Table 5-1 are considered static models.

Dynamic models are designed to simulate effects of factors that change the relative costs and competitive position of businesses in an area, as can occur from

changes in occupation wage rates, population and labor force rates, energy and transportation costs, cost of capital, etc. For example, "the REMI® model estimates the future economic profile of a region based on national forecasts of industry growth, changing technology, and its own estimates of the shifting competitive position of each industry in a given region compared to that industry elsewhere in the country" (Weisbrod 1990). REMI® TranSight™ (REMI 2005) and the Highway Economic Analysis Tool (HEAT) model developed by Cambridge Systematics for the Montana Department of Transportation (MDT) (Wornum et al. 2005) are dynamic models. The core of TranSight™ and HEAT is REMI®'s Policy Insight™ economic analysis model. The FHWA Highway Economic Requirements System – State Version (HERS-ST) is not a true dynamic model, though it does contain some characteristics of a dynamic model and is therefore oftentimes grouped in this category.

Table 5-1. Summary of Economic Development Models.

Software	REMI TranSight	HEAT	HERS-ST	STEAM	RIMS-II	IMPLAN
Produced by: (Organization)	Regional Economic Models, Inc. (REMI)	Cambridge Systematics (CS)	Federal Highway Administration (FHWA)	Federal Highway Administration (FHWA)	Bureau of Economic Analysis (BEA)	Minnesota IMPLAN Group (MIG, Inc.)
Type of model	Dynamic	Dynamic	Benefit/Cost	Benefit/Cost	Input/Output	Input/Output
Initial Cost	Varies (>$100,000)	Varies. >$500,000 for Montana DOT. If CS works as a systems integrator, given REMI products are available, cost may be >$100,000	Free	Free	Free	Varies for region files desired
Annual Cost	Varies (~$20,000)	Varies (~$20,000)	None	None	None	Varies
Department Costs[1]	1-3 FTE	1-3 FTE	1 FTE	0.5-1 FTE	0.5-1 FTE	0.5-1 FTE
Inputs	VMT, VHT, Emissions (VOC), Safety, Fuel demand, Time savings (from a transportation planning model)	Depends on set-up, but similar to REMI TranSight (for the Montana DOT, CS created a travel demand model)	Highway data in HPMS (Highway Performance Monitoring System) format. Can use GIS files for producing maps	From four-step travel demand models (e.g. TP+), person and vehicle trip table	Industry category, job cost (in 1997 dollars), location; a set of *multipliers* for the study region	Industry category, job cost, location; a set of *multipliers* for the study region
Outputs	Employment by industry, output by industry, wage rates and personal income, population by demographic group, gross regional product	Prioritization of projects (based on B/C), capital and operating costs of highway improvements, employment, industry impacts	REMI ready parameters, cost of highway deficiencies, capital expenditure justification	Network traffic effects of projects, compares projects of different modes, estimation of system-wide impacts	Wages/salaries, economic activity resulting from spending, jobs created	Impact data ("what if" data, e.g. what if industry x adds 200 jobs in Utah county)
Transportation terms	Yes	Yes	Yes	Yes	No	No
Economics analysis intensive	Yes	Yes	No	No	No	No
Transportation modeling	No, but inputs are from transportation model	Yes	No	No	No	No
Interface with Planning Model	Yes	Yes	Yes	Yes	No	No
Compatible with Governors Office of Planning and Budget (GOPB) model (REMI Policy Insight)	Yes	Yes	Yes	Yes	No	No
Support available	Yes	Yes	Yes	Yes, through Cambridge Systematics	Yes	Yes

[1] Department costs are estimates and are in units of Full Time Equivalent (FTE). Department costs could be supplemented with Consultant services

6 Process Development

This section of the summary report provides information on the process development portion of the research. The purpose of this portion of the research was to develop a process whereby economic impacts can be incorporated in the evaluation of capacity projects if such analyses are required. This process development will incorporate the information gleaned from each of the previous tasks to make preliminary recommendations. The three primary evaluation methods summarized include BCA, selection process scoring, and other economic program alternatives.

6.1 Benefit Cost Analysis

As previously outlined any potential tool for incorporating economics into the planning process is in some sense a BCA, weighing the benefits versus the costs of the project. The difference in the possible tool options is the extent in which benefits and costs are measured. The two types of BCA identified previously include UIA and EIA. Each of these will be discussed in more detail in the following sections including a discussion of UIA, short term EIA, and long term EIA.

6.1.1 User Impact Analyses

The foremost advantage of a UIA is its simplicity as a UIA can be done in-house without trained economists. Two examples of UIAs are the Interplan I-80 report (Rifkin 2005) and the American Association of State Highway and Transportation Officials (AASHTO) *User Benefit Analysis for Highways* (AASHTO 2003). Consulting costs for such a UIA would vary depending on the level of complexity and analysis. As indicated, UIAs provide only monetary savings and costs to users (not job creation or gross domestic product predictions); however, the users can be distinguished into market categories such as personal, freight, or other business user.

According to the research conducted, the AASHTO *User Benefit Analysis for Highways* guidelines provide what may be one of the best approaches to completing a UIA. The eleven basic steps in the user benefit analysis include the following (AASHTO 2003):

1. Define the project alternative and the base case.
2. Determine the level of detail required.
3. Develop basic user costs factors.
4. Select economic factors.
5. Obtain traffic performance data for explicitly-modeled periods.
6. Measure user costs for affected links or corridors.
7. Calculate user benefits.
8. Extrapolate/interpolate benefits to all project years.
9. Estimate the terminal value.
10. Determine the present value of benefits and costs.
11. Make a project selection decision.

A major advantage of this process is that the AASHTO guidelines (AASHTO 2003) provide detailed guidance for completion of each of the steps in the analysis.

6.1.2 Short Term Economic Impact Analysis

EIA complexity depends primarily on the length of the time period to be analyzed. Static analyses, or measurements of impacts up to a year, can be completed relatively easily with I-O spreadsheets. Regional multipliers will translate business cost savings and construction spending to jobs and other outputs respective to the effected industry. These spreadsheets are readily accessible and relatively inexpensive and can be purchased from RIMS-II or IMPLAN, with IMPLAN available for under $2,000 (year 2005 dollars). Training can also be provided for IMPLAN for an additional cost of approximately $1,000 (year 2005 dollars) (Minnesota 2005). Additionally, locally created I-O matrices can be accessed through the Utah Governor's Office of Planning and Budget (GOPB) (GOPB 2005), while outside consulting could also be contracted for these types of analyses.

6.1.3 Long Term Economic Impact Analysis

Dynamic analyses or measurements of impacts over several years requires more powerful econometric modeling software. At the time of this study only one known program was on the market with these capabilities; REMI®'s economic development models and software programs, and only a handful of major consulting firms offer these services. The Utah GOPB currently uses REMI® Policy Insight™ for their economic analyses. Some experienced consulting firms that perform these services include Cambridge Systematics, EDR Group, and HLB Economics. As previously mentioned, Cambridge Systematics created the HEAT program for MDT (Wornum et al. 2005) and they have also completed an economic impact study for Envision Utah concerning the expansion of public transportation along the Wasatch Front (Cambridge 2005). Based on discussion with the vendors and consultants, the estimated costs for a custom designed and built program from either REMI® or Cambridge Systematics is approximately $100,000 minimum for the setup of the model with yearly maintenance fees of approximately $20,000 per year (year 2005 dollars).

It is important to note that not all econometric analyses would have to be contracted out long term to consultants. After initial set-up, these analyses could be completed by a partnership of Utah organizations; namely UDOT, GOPB, and local MPOs. The research team recommends a partnership of this kind as a possible resolution for the completion of a long term EIA. In choosing this approach a consultant would have to be hired initially until one or more staff internal to one or more of the three partnering groups could be trained to carry out the procedure. The proposed conceptual organizational architecture developed by the research team for such a program is illustrated in Figure 6-1.

Some recommended requirements for success of such a model would include:

- Commitment and participation of all parties involved, including time, funding, and consistency in model input, use, and evaluation.
- Consistent and ongoing communication between all participants.
- Strong facilitator responsible for the integration within the proposed architecture (it is recommended that a consultant be retained for this role to provide stability and consistency to the process).

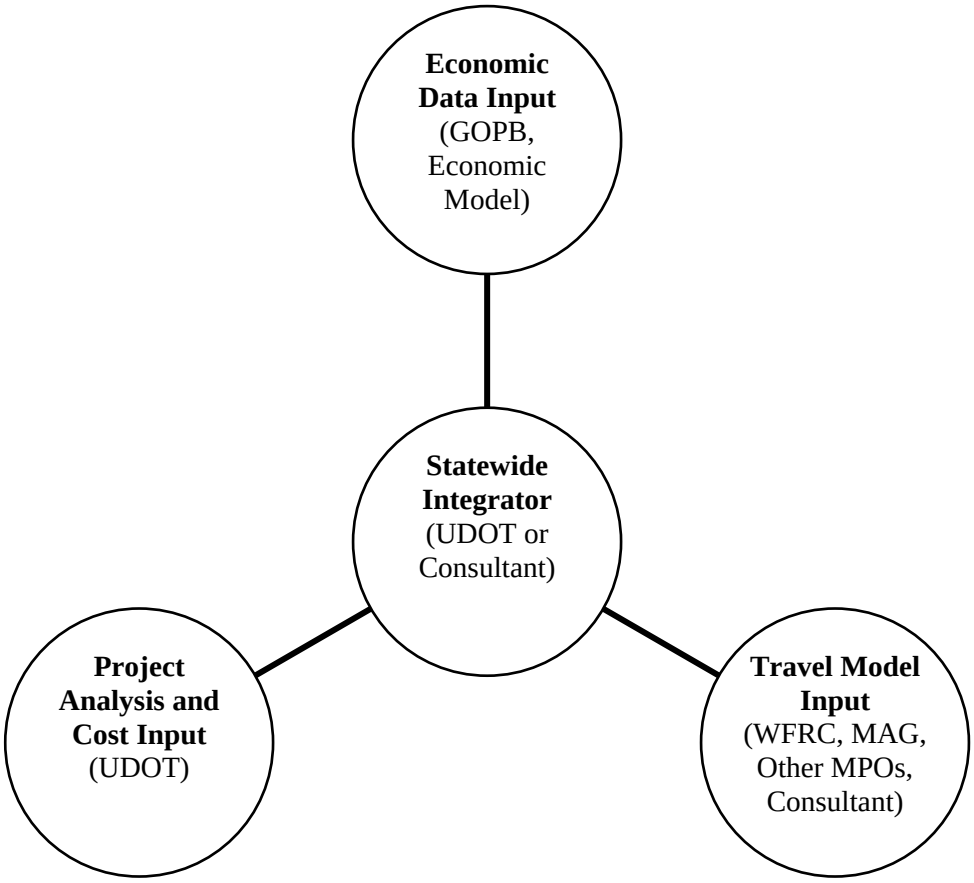


Figure 6-1. **Conceptual Agency Coordination Model**.

6.2 Selection Process Scoring System

The results of a BCA can be used to order or prioritize a list of project alternatives as to which provides the greatest benefits for the least cost. If this is the only project selection criteria then the first and best choice is the project that scores the highest in the BCA. However, this is typically not the only selection criterion that projects are subjected to and so the BCA carries only a portion of the total decision. This requires a categorical scoring process under which each project receives a score in each criterion

and the individual scores are added for a total project score. The total project scores are the final prioritization results.

To determine the weight of the BCA in the total scoring process, the type of BCA used (UIA, static, or dynamic), its accuracy, and the extent of the analysis should be considered. The Wisconsin DOT weighs their economic criteria as 37.5 percent of the total (Wisconsin 1999). The equation for the total BCA score is (Wisconsin 1999):

$$\text{Benefit Cost Ratio Score} = [(B/C) / (B/C_{max})](100)(.375)$$

The Ohio DOT counts economic analysis criteria as 30 percent (Ohio 2003). The Missouri DOT changes the weighting of economic criteria according to the type of project, whether it is a safety oriented or capacity adding project. For capacity adding projects Missouri sets the weighting at 15 percent (Missouri 2004). From the results of the BYU/UDOT survey of Utah transportation professionals and decision makers, respondents considered 10 to 15 percent to be a reasonable weight.

Scoring of an EIA will require additional subcategories according to chosen metrics, such as, employment, income, gross regional product, etc. Some metrics may be of greater or lesser importance in the total decision. For example, if job creation is determined to be more important in the decision making process it should be assigned a greater weight in the selection process.

To illustrate how the economic score can be allocated, the following examples are provided. The Wisconsin DOT breaks their 40 percent economic score into the following (Wisconsin 1999):

- 15% Reduction in travel cost versus construction costs
- 5% Businesses that will benefit
- 5% Economic growth potential
- 5% Unique reasons why project will attract new businesses
- 10% Part of Corridors 2020 (designated priority network)

The Ohio DOT breaks their 30 percent economic score into five parts (Ohio 2003):

10% Non-retail jobs created

5% Job retention

5% Economic distress

5% Cost effectiveness (ratio of cost divided by jobs created)

5% Non-retail, private sector investment

The Missouri DOT breaks their 15 percent economic score into three parts (Missouri 2004):

6.0% Strategic economic corridor

4.5% Level of economic distress

4.5% Support of regional economic development plans

From the BYU/UDOT survey, respondents indicated that job creation, job retention, tax revenue, and location of the project were the most important subcategories in the economic scoring. All of the three above economic criteria require an EIA, meaning the AASHTO method (AASHTO 2003) would be insufficient, unless supplemented with some form of a discretionary analysis methodology.

6.3 Other Economic Program Alternatives

Choosing transportation improvements that best meet the needs of a developing economy might be best done with a separate program that allows for more freedom to create projects oriented towards economic development. These projects would likely be smaller in scale but would be contracted to meet specific economic development requirements, such as job creation. Such a program to design and build "economic development oriented projects" would be possibilities for partnership with other organizations that can share in funding and economic development experience. Several states have successful business or industry access programs that could serve as a pattern for UDOT, such as, Wisconsin, Massachusetts, Tennessee, Alabama, and others. Further freedom afforded by this program would be seen in businesses generating and submitting candidate projects themselves, leaving UDOT free to continue pursuing the development of the prioritized network and existing infrastructure.

7 Recommended Alternatives

In the previous chapter, the concepts of BCA at different complexity levels, methods to including a BCA in the selection process, and other avenues to deal with inclusion of economic development issues in project selection and implementation were discussed. In this chapter, recommended alternatives for UDOT to consider economic development as a factor for selecting future projects for funding are provided. It was determined through the research process and the steering committee meetings that economic development analysis of any kind would be limited to projects of $5.0 million or greater. Based on the findings of the literature search, survey summaries, model evaluations, and outcomes of the steering committee meetings, four approaches are recommended as alternatives to meet the needs for project selection and the desire for considering economic development as a factor for project selection. These approaches include BCA, economic development analysis, project scoring systems, and a combination of approaches. Each of these approaches will be discussed briefly in the following sections.

7.1 Approach 1: Benefit/Cost Analysis

Not all capacity improvement projects require consideration of economic development issues in their evaluations. Hence, the first level analysis would involve only UIA, the very basic method for evaluating the feasibility of a project. This level of project prioritization would follow the AASHTO guidelines (AASHTO 2003), in which direct user benefits are assessed. This analysis will weed out infeasible projects in the first step of the project prioritization process. The results of this analysis can be used independently to create a final prioritization list, or they can be used an input to further

analysis. This level of analysis can be accomplished by UDOT engineers or their Consultants.

7.2 Approach 2: Economic Development Analysis

Once projects worthy for further considerations have been determined through a BCA analysis, UDOT can identify projects that require explicit economic development analysis through a formal EIA. As previously discussed, two levels of EIAs are available: short term and long term. For a short term, (e.g., one-year EIA), an I-O model analysis would be most suited. For a long term EIA, models that incorporate dynamic interactions of industry groups are required, such as REMI® TranSight™ (REMI 2005) or a HEAT type model (Wornum et al. 2005). This approach would follow the proposed architecture outlined previously in Figure 6-1. In this approach, UDOT would require a facilitator (either a consultant or UDOT), working with GOPB/REMI® (for economic analysis), UDOT (for cost estimation), and MPOs/consultant (for the modeling portion). Commitment of all organizations would be essential for this approach to be successful. Based on early cost estimates, this type of analysis would cost more than $100,000 initial start-up with yearly maintenance fees of approximately $20,000 (year 2005 dollars). This approach would require a minimum of one full-time UDOT staff member to run the model and coordinate the data. Additional staff may be required depending on the level of detail and involvement of the analysis as it progresses.

7.3 Approach 3: Project Scoring System

With approach 1, only results of BCA are used for project prioritization. Capacity enhancement projects are generally not solely selected based on the BCA value. Additional factors are often considered in finalizing project priorities. Project scoring has been used by many organizations; it is an effort to consider multiple objectives in project selection. This approach could follow a number of formats with the Ohio TRAC scoring (Ohio 2003) and the Wisconsin DOT scoring process (Wisconsin 1999) referenced as examples. Decision makers should come to consensus on the factors to be used, their weights, and the scoring structure that would be employed for Utah.

Scoring requires manpower. In Ohio's TRAC case for example, one full-time employee works with their TRAC, as well as two or three part-time employees who help

with such tasks as estimating costs and scoring reductions. The employees do all of the briefing of the Committee (for Utah, the Transportation Commission), and prepare all of the documentation. Wisconsin has a similar process to which they have indicated that they have three full-time employees who administer the program (using REMI® Policy Insight®), and that the cost to the Department for the employees is approximately $200,000 per year (year 2005 dollars). As examples, Figure 7-1, Figure 7-2, and Figure 7-3 illustrate the overall scoring structures of the Wisconsin DOT, Ohio DOT, and Missouri DOT, respectively. While the previous discussion illustrated the economic criteria, these figures provide examples of the types of factors considered (including economic and other criteria) and their weights.

7.4 Approach 4: Combination of Approaches

This option combines Approach 1 (BCA), Approach 2 (EIA), and Approach 3 (Project Scoring System). The BCA could be worked into the scoring structure, or be independent of the score. For capacity improvement projects, the BCA is the first step to consider projects for prioritization. Once projects pass Approach 1, feasibility of the projects has been provided. In the second stage selection, a number of additional factors can be considered based on individual project service requirements, including economic development related factors, transportation efficiency factors, environmental factors, and others. Figure 7-4 provides a flowchart of the combination of approaches including optional inputs and overall output of the process.

7.5 Summary of Alternatives

The preceding sections have identified a number of approaches available to assess the economic impacts of transportation improvement projects as a result of the research conducted. As can be seen from the analysis, a number of options are available for a wide range of costs to the Department. Each of the options and costs has been considered by the steering committee and the Transportation Commission, with a recommended action provided in the concluding section of this report.

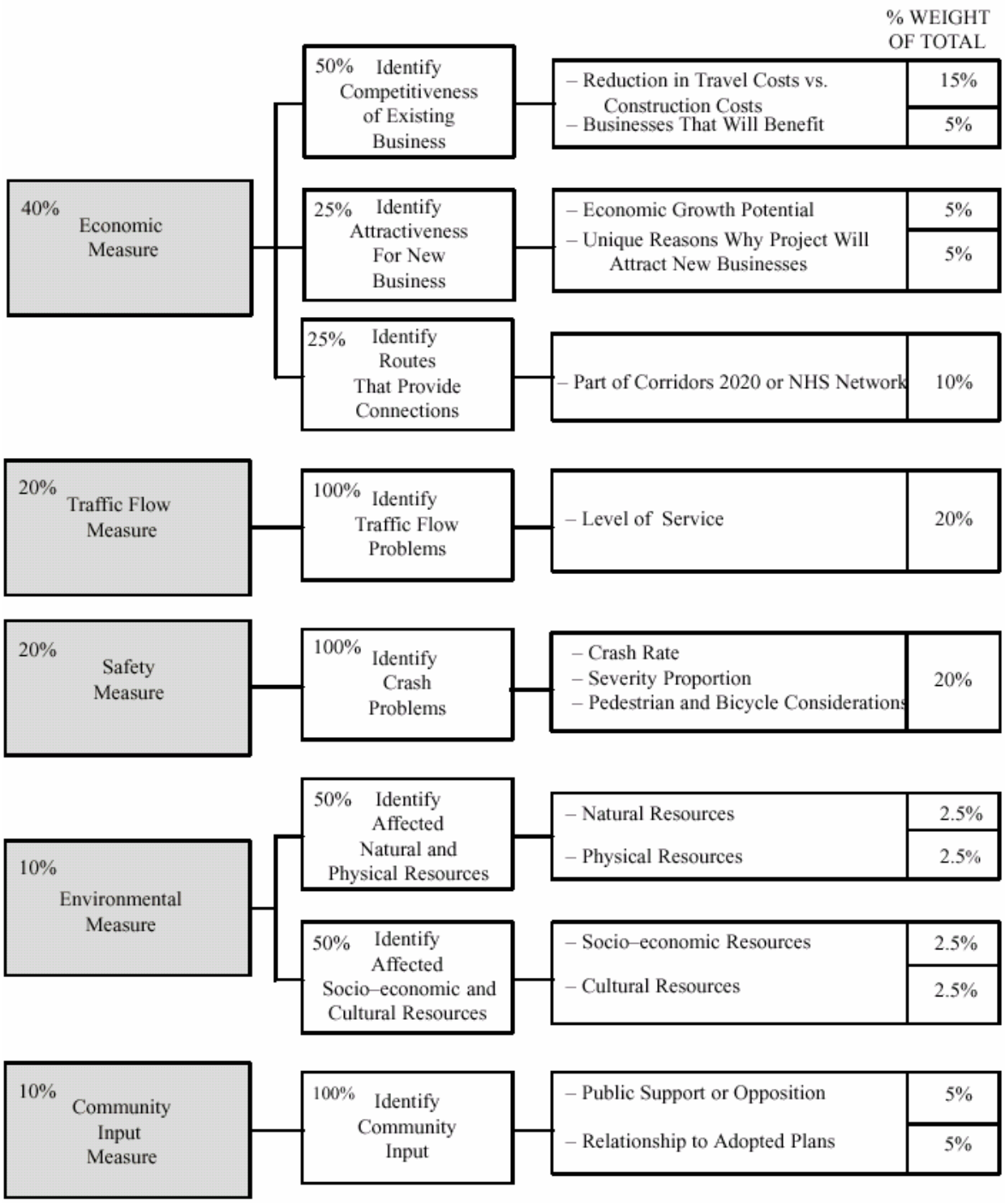


Figure 7-1. Wisconsin DOT Prioritization Process (Wisconsin 1999).

Goal	Factors	Maximum Score
Transportation Efficiency	Average Daily Traffic – Volume of traffic on a daily average	20
	Volume to Capacity Ratio – A measure of a highway's congestion	20
	Roadway Classification – A measure of a highway's importance	5
	Macro Corridor Completion – Does the project contribute to the completion of a Macro Corridor?	10
Safety	Accident Rate – Number of accident per 1 million mile of travel during 3 year period.	15
Transportation points account for at least 70 % of a projects base score		**70**
Economic Development	Job Creation – The level of non-retail jobs the project creates.	10
	Job Retention – Evidence that the job will retain existing jobs.	5
	Economic Distress – Points based upon the severity of the unemployment rate of the country.	5
	Cost Effectiveness of Investment – A ratio of the cost of the jobs created and investment attracted. Determined by dividing the cost to the Ohio for the transportation project by the number of jobs created.	5
	Level of Investment – The level of private sector, non-retail capital attracted to Ohio because of the project.	5
Economic Development Points account for up to 30% of a projects base score		**30**
Additional Points		
Funding	Public/Private/Local Participation – Dose this project leverage additional fund which allow state fund to be augmented?	15
Unique Multi-Modal Impacts	Does this project have some unique multi-modal impact?	5
Urban Revitalization	Does this project provide direct access to cap zone areas or Brownfield site?	10
Total possible Points including Transportation, Economic Development and additional categories		**130**

Figure 7-2. Ohio DOT TRAC Prioritization Process (adapted from Ohio 2003).

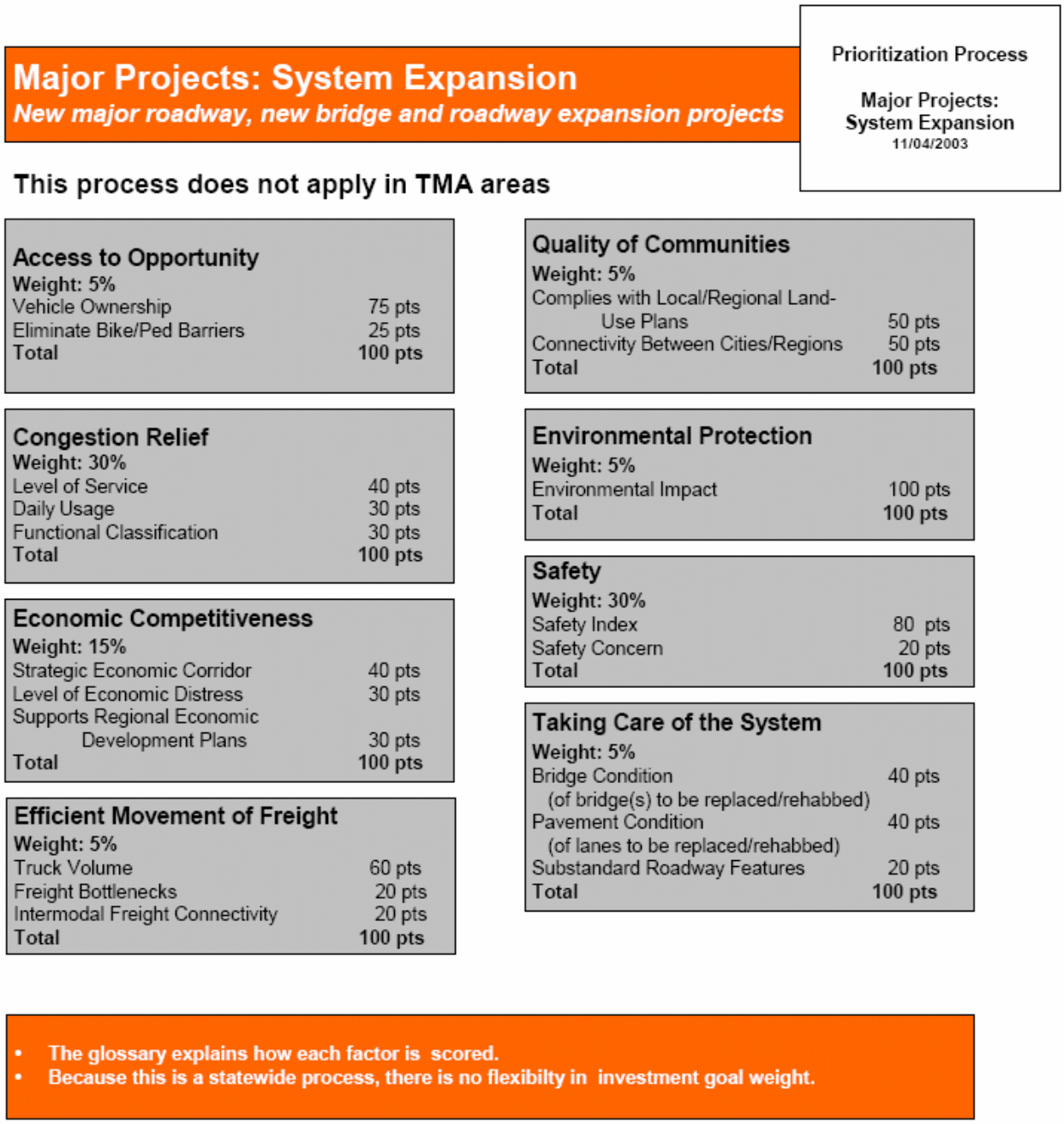


Figure 7-3. Missouri DOT Prioritization Process (Missouri 2004).

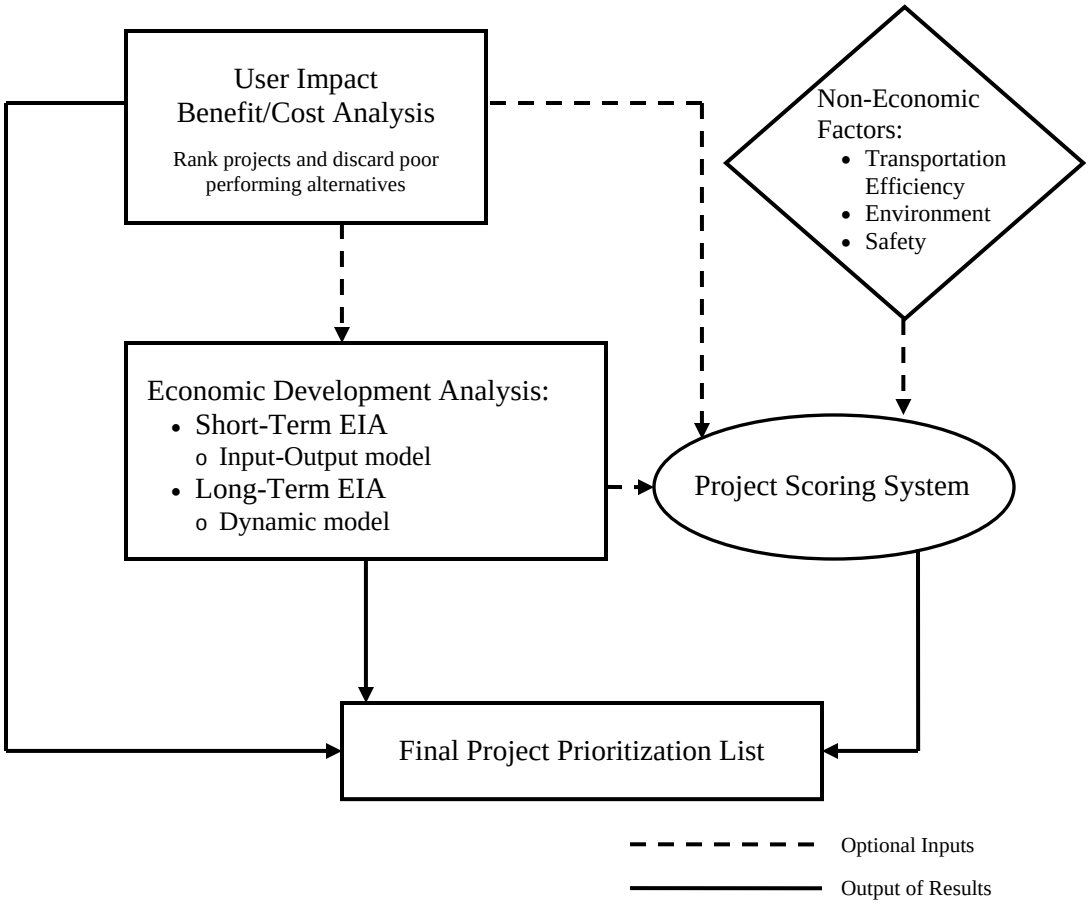


Figure 7-4. Economic Analysis Alternatives.

8 Conclusions and Committee Recommended Action

To provide an opportunity for increased efficiency in project selection the steering committee has recommended a process using economics as one of the available selection metrics. The tool formulated will provide direction and guidance to the Transportation Commission and the Utah Department of Transportation (UDOT) personnel on the prioritization of projects base on economic performance and analysis. The results are planned to be incorporated into the long range planning process. The following results or recommendations have been arrived upon through a procedure of: 1) determining the state of the practice for transportation economic analysis, 2) establishing the criteria that should be considered in the economic analysis process, 3) evaluating the tools available to meet these needs, and 4) making recommendations on how to proceed to meet these objectives. The project accomplished the purpose of evaluation of the tools available for incorporating economic evaluation metrics in the transportation planning process. The data gleaned from this process has led to current recommended action and will service as a reference in the future as the process is reconsidered in the case of improved technology or new economic and transportation system dynamics.

In response to the assessment of the economic development impacts of transportation improvement projects, the steering committee has recommended that a two-tier project prioritization process be implemented for all projects with a total cost of $5 million or greater. This means that all eligible capacity increasing transportation projects submitted for funding approval will be subjected to a two-tier evaluation system. The first tier submits all projects to an objective scoring system that includes transportation efficiency and safety factors. Those projects selected in the first tier for further analysis would be evaluated in the second tier, where economic development impacts are considered. This two-tier type of analysis includes key components of both

benefit/cost analysis (BCA) and project scoring processes, without assigning specific scores or weights to projects in the second tier evaluation process.

The first tier evaluation system is designed as the primary selection process. As the focus of this paper is economic criteria evaluation the first tier procedure (i.e., safety and efficiency scoring) is outside of the scope of this project. The choices as to which weights and metrics to be included have been evaluated in a different setting and can be obtained through UDOT. In summary, these metrics include: average daily traffic (ADT), truck ADT, type of roadway or functional classification, volume to capacity ratio (v/c), safety, and traffic growth. Weights assigned to the respective metrics would likely be between 5 and 25 percent.

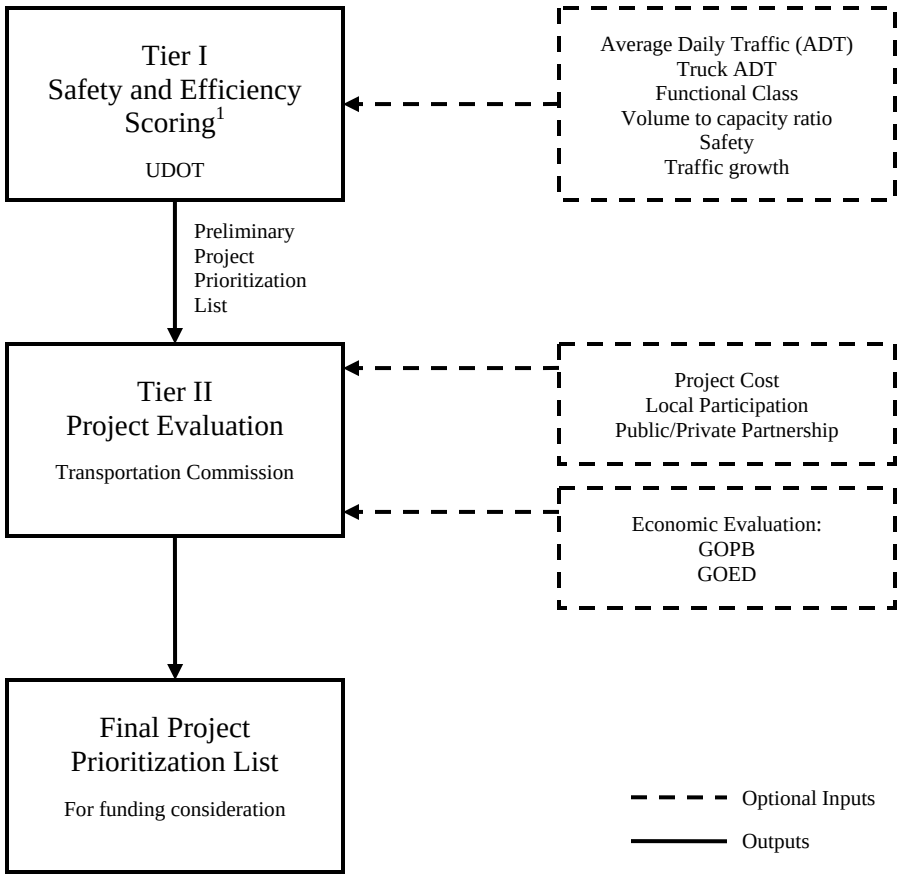
Tier two of the procedure provides an opportunity for further evaluation intended to prioritize those projects selected in the first tier. Similar to the first tier, all criteria and sub-criteria to be included in the second tier have not been finalized, but it is the current recommendation of the steering committee that the economic development impact of the transportation project be considered as part of this tier. Other criteria considered in the tier two analysis include: project cost; local participation; public/private partnering; and others as determined by UDOT and the Transportation Commission.

One of the primary reasons for this recommendation stems from the present high cost and complexity of the techniques and models used to quantify the economic development impacts of transportation improvement projects as outlined previously. The most accurate economic models would likely also require a full time staff dedicated to data gathering and entry, and insuring local industry calibration. Furthermore, the accuracy of the resulting economic impact analysis (EIA) figures, regardless of the quality of the economic model, depends on the quality of the inputs. The inputs, provided by the estimations and outputs of the local travel demand model, would then stand in need to be evaluated and level of acceptable accuracy would be decided.

Rather than expending the limited resources of the Department on a formal economic development modeling process, it was determined that an economic development prioritization process would be recommended wherein the Transportation Commission will request information from the Governor's Office of Planning and Budget (GOPB) and/or the Governor's Office of Economic Development (GOED) on the

economic potential (e.g., job creation) of each project selected in the tier one process. Within the GOPB is a planning division of Demographic and Economic Analysis (DEA), who among other things: "assesses the economic, demographic, and fiscal impacts of projects and policies; projects and analyzes long-term economic and demographic trends; coordinates the U.S. Bureau of the Census State Business and Industry Data Center Program in Utah; compiles, organizes, and disseminates data and special studies on issues relevant to state planning and budgeting" (GOPB 2005). The GOPB currently holds two licenses of REMI®, which they use for economic impact forecasting. The GOED is a newly created office replacing the former Division of Business and Economic Development. Some major focuses of GOED are corporation recruiting, rural assistance, economic cluster initiative, and tourism (GOED 2005). It is anticipated that either or both the GOPB and the GOED would be able to provide important data estimations such as potential demographic and economic impacts on job creation, business relocation, tourism, personal income, business output, property values, tax revenue, and immigration. This information will then be used by the Transportation Commission in conjunction with other tier two evaluation criteria (e.g., project costs, local participation, private/public partnering, etc.) to make final project funding determinations.

This type of analysis includes key components of both BCA and project scoring processes without assigning specific scores or weights to project in the second tier evaluation process. The information, however, will be used by the Transportation Commission in making final funding decisions. A summary flowchart of the recommended process is provided in Figure 8-1.



[1] Process applies to projects with total cost of $5 million or greater

Figure 8-1. Proposed Evaluation Flowchart.

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